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The median absolute magnitude can be computed from the parallax and apparent magnitude, or read from the period-luminosity curve (*Mt. Wilson Contr.* 151). The anomalous position in space of W *Serpentis* has been discussed in a preceding note. A few points relating to the other stars of the list may be worth mentioning.

1. The period of SW *Tauri* is very uncommon, coming between the values typical for the long and short period groups of Cepheids. Its galactic position suggests affiliation with the short period group.

2. The period of RZ *Tauri*, four hours and eight minutes, is the shortest on record for a cluster type variable with the single exception of XX *Cygni*, period three hours and fourteen minutes.

3. The two long period Cepheids, 144—*Aurigae* and ST *Tauri*, show the concentration to the galactic plane characteristic for such stars, W *Virginis* being the only conspicuous exception. Similarly, the five variables of the short-period group illustrate the wide distribution in galactic latitude and in distance from the galactic plane that is usual for short-period Cepheids.

HARLOW SHAPLEY.

CHANGES IN THE SPECTRUM OF OMICRON CETI.

Observations of the spectrum of *Omicron Ceti*, made during the period of its decline in brightness from the maximum of the summer of 1919, show that the changes which occurred up to the middle of December are such as are well known from previous investigations. As the star grows fainter the banded character of the spectrum becomes more pronounced, especially in the region λ4400-4600; the relative intensity of the hydrogen lines changes, Hγ becoming stronger with reference to Hδ; λ4227 of calcium and the chromium lines λ4255 and λ4275 become broader and stronger, and many other low temperature lines increase in prominence; finally a number of narrow bright lines develop, most of which may be identified with low temperature lines of various elements, more especially of iron. The magnesium line at λ4571 becomes much the strongest of these lines by the time the star has decreased considerably in light. A spectrogram taken on December 12 shows these characteristics plainly, the hydrogen lines, like the bright low-temperature lines, being narrow and well-defined.

A very marked change is shown on the first photograph of the following month, January 7th. The hydrogen lines appear very diffuse and greatly displaced toward the red. A second stronger spectrogram was obtained on January 15th, and the peculiar character of the spectrum can be seen more clearly. The narrow bright low-temperature lines seem to remain unchanged, and measures of their positions indicate no certain variation in the displacements found for them at other phases of the star's light. On the other hand, the hydrogen lines are greatly widened toward the red and show a large displacement relative to the narrow bright lines. The brightest of the three hydrogen lines on the photograph is $H\beta$, $H\gamma$ being next and $H\delta$ faint. They appear short and stubby as compared with the narrow bright lines, which seem to project beyond the continuous spectrum. This last plate is weak and only a few absorption lines are seen.

Two weeks later, on January 29th, another photograph was obtained. The most striking feature on this plate is the presence of the helium line $\lambda 4472$. It is of moderate strength and, like the hydrogen lines, is broad and diffuse. The hydrogen lines themselves are considerably stronger relative to the continuous spectrum than they were on January 15th, and are cut off sharply at the edge of the continuous spectrum, while the narrow bright lines project beyond. It seems probable that this effect indicates a real difference in the extent of the atmosphere within which the different lines are produced, since the hydrogen lines $H\gamma$ and $H\beta$ are brighter than any of the narrow lines, with the possible exception of $\lambda 4571$, and so should be affected by irradiation at least as much. The helium line $\lambda 4472$ resembles the hydrogen lines closely in its behavior. It would appear, therefore, that the hydrogen and helium radiations are confined to a low level in the stellar atmosphere, while the narrow low temperature lines extend far out to the higher levels. From the form of the narrow bright lines it seems probable that if such an envelope exists it is somewhat eccentric with reference to the star itself.

A peculiar feature of the spectrum is the presence of what appears to be absorption lines on the violet side of $H\gamma$ and $H\beta$, displaced somewhat to the violet from the normal position of these lines. The combination of bright and dark lines bears some resemblance to that found in P *Cygni* and certain other stars.

A summary of these results may be of interest:

	Hydrogen Lines		Narrow Bright Lines
Date	Character	Displacement	Displacement
1919, December 12	Narrow	$+51^{km}$	$+50^{km}$
1920, January 15	Broad, diffuse	+140	+55
January 29	Broad, diffuse	+150	+56
February 6	Broad, diffuse	+160	+53

The displacements of the broad hydrogen lines are given in terms of velocity, but it seems more probable that they are due to some cause other than the Doppler effect. The helium line is difficult of measurement, but its displacement seems to be intermediate between that of the hydrogen and the narrow bright lines.

The character of the hydrogen lines and λ4472, and the relative intensities of the former, suggest a source of radiation quite different from that which produced the narrow hydrogen lines seen previously. It is as tho a fresh radiative pulse had occurred in the comparatively dense gas present in the lower layers of the star's atmosphere, thus producing broad lines which, like many of the iron lines investigated in the laboratory, might show a marked widening toward the red.

Especial interest will attach to the observations of the behavior of these lines thruout the star's minimum of light, which will be made as soon as the period admits of work at this phase. At present the conjunction with the Sun occurs during minimum light. The possibility of similar phenomena in the spectra of other stars of type Md near minimum of light is also a matter of much interest.

W. S. ADAMS.
A. H. JOY.

PHOTOMETRIC TESTS OF ADAMS AND JOY'S LIST OF STARS WITH SPECTRA SIMILAR TO THE CEPHEID VARIABLES

In the autumn of 1917 Mr. W. S. Adams kindly forwarded to me a list of stars which because of their spectra might be variables of the Cepheid type. This list was afterwards extended and described by Adams and Joy[1] at the Pasadena meeting of the Astronomical Society of the Pacific. The stars were placed on our observing

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[1] *Publications A. S. P.*, **31,** 184, 1919.